

WHAT IS CLAIMED IS

1. A coating on high tensile steel comprising the fused and cured product of a coating powder composition comprising

100 parts of a resin comprising between about 75 and about 95 wt%, based on total weight of A) plus B), of an epoxy resin component A) plus B) between about 5 and about 25

5 wt%, based on total weight of A) plus B), of an elastomer component B) having a glass transition temperature of -30°C or below, and

at least about 75 parts of zinc powder.

2. The coating according to Claim 1 wherein said epoxy component is a bisphenol A epoxy resin.

3. The coating according to Claim 1 wherein said elastomer component is carboxyl terminated butadiene/acrylonitrile rubber.

4. The coating of Claim 1 wherein said composition contains at least about 150 parts of zinc powder

5. The coating of Claim 1 wherein said composition contains at least about 200 parts of zinc powder.

6. The coating according to Claim 1 wherein said elastomer component has a glass transition temperature of -40°C or below.

7. The coating according to Claim 1 having a thickness of between about 12 and about 20 mils.

8. A dual coating for high tensile steel comprising a first coat in contact with said high tensile steel and a second outer coat,

said first coat comprising the fused and cured product of a coating powder composition comprising

5 100 parts of a resin comprising between about 75 and about 95 wt%, based on total weight of A) plus B), of an epoxy resin component A) plus B) between about 5 and about 25

wt%, based on total weight of A) plus B), of an elastomer B) component having a glass transition temperature of -30°C or below, and

at least about 75 parts of zinc powder,

10 said second coat comprising the fused and cured product of a coating powder composition comprising

100 parts of a resin comprising between about 75 and about 95 wt%, based on total weight of A) plus B), of an epoxy resin component A) plus B) between about 5 and about 25 wt%, based on total weight of A) plus B), of an elastomer component having a glass transition 15 temperature of -30°C or below, said second coating being zinc-free.

9. The coating powder according to Claim 8 wherein said epoxy component of said first coat and of said second coat is a bisphenol A epoxy resin.

10. The coating according to Claim 8 wherein said elastomer component of said first coat and of said second coat is carboxyl terminated butadiene/acrylonitrile rubber.

11. The coating of Claim 8 wherein the coating composition of said first coat contains at least about 150 parts of zinc powder

12. The coating of Claim 8 wherein the coating composition of said first coat contains at least about 200 parts of zinc powder.

13. The coating according to Claim 8 wherein said elastomer component of said first coat and of said second coat has a glass transition temperature of -40°C or below.

14. The coating according to Claim 8 wherein said first coat is between about 1.5 and about 3 mils thick and said second coat is between about 10 and about 15 mils thick.

15. The coating according to Claim 8 wherein said second coat is porous so as to have a density reduced at least about 25 % relative to theoretical density.

16. The coating according to Claim 8 wherein said second coat composition contains between about 20 and about 80 phr fibers.

17. The coating according to Claim 16 wherein said second coat is porous so as to have a density reduced at least about 25 % relative to theoretical density.

18. A coating on high tensile steel comprising the fused and cured product of a coating powder composition comprising

100 parts of a core/shell resin comprising a core of A) an acrylic rubber component having a glass transition temperature of -30 or below °C, plus B) a shell of an epoxy resin component, said core A) and said shell B) being chemically bonded to each other, said core A) comprising between about 5 and about 20 wt% based on total of A) plus B) and said shell B) comprising between about 80 and about 95 wt% based on A) plus B), and

5 at least about 75 parts of zinc powder.

19. The coating according to Claim 18 wherein said epoxy resin component is a bisphenol A epoxy resin.

20. The coating of Claim 18 wherein said composition contains at least about 150 parts of zinc powder

21. The coating of Claim 18 wherein said composition contains at least about 200 parts of zinc powder.

22. The coating according to Claim 18 having a thickness of between about 12 and about 20 mils.

23. A dual coating for high tensile steel comprising a first coat in contact with said high tensile steel and a second outer coat,

5 said first coat comprising the fused and cured product of a coating powder composition comprising

100 parts of a core/shell resin comprising a core of A) an acrylic rubber component having a glass transition temperature of -30 °C or below, plus B) a shell of an epoxy resin component, said core A) and said shell B) being chemically bonded to each other, said core A) comprising between about 5 and about 20 wt% based on total of A) plus B) and said shell B) comprising between about 80 and about 95 wt% based on A) plus B), and

10 at least about 75 parts of zinc powder

said second coat comprising the fused and cured product of a coating powder composition comprising

100 parts of a core/shell resin comprising a core of A) an acrylic rubber component having a glass transition temperature of -30 or below °C, plus B) a shell of an epoxy resin component, said core A) and said shell B) being chemically bonded to each other, said core A) comprising between about 5 and about 20 wt% based on total of A) plus B) and said shell B) comprising between about 80 and about 95 wt% based on A) plus B), said second coat being zinc-free.

24. The coating powder according to Claim 23 wherein said epoxy component of said first coat and of said second coat is a bisphenol A epoxy resin.

25. The coating of Claim 23 wherein the coating composition of said first coat contains at least about 150 parts of zinc powder

26. The coating of Claim 23 wherein the coating composition of said first coat contains at least about 200 parts of zinc powder.

27. The coating according to Claim 23 wherein said first coat is between about 1.5 and about 3 mils thick and said second coat is between about 10 and about 15 mils thick.

28. The coating according to Claim 23 wherein said second coat is porous so as to have a density reduced at least about 25 % relative to theoretical density

29. The coating according to Claim 23 wherein said second coat composition contains between about 20 and about 30 phr fibers.

30. The coating according to Claim 29 wherein said second coat is porous so as to have a density reduced at least about 25 % relative to theoretical density

31. A coating on high tensile steel comprising the fused and cured product of a coating powder composition comprising

100 parts of a resin comprising A) an epoxy resin plus B) a polyhydroxyl functional cross-linker having a hydroxy equivalent weight between about 200 and about 500, and  
5 at least about 75 parts of zinc powder.

32. The coating according to Claim 31 wherein said epoxy resin is a bisphenol A epoxy resin.
33. The coating of Claim 31 wherein said composition contains at least about 150 parts of zinc powder.
34. The coating of Claim 31 wherein said composition contains at least about 200 parts of zinc powder.
35. The coating according to Claim 31 having a thickness of between about 12 and about 20 mils.
36. A dual coating for high tensile steel comprising a first coat in contact with said high tensile steel and a second outer coat,  
said first coat comprising the fused and cured product of a coating powder composition comprising  
5 100 parts of a resin comprising A) an epoxy resin plus B) a polyhydroxyl functional cross-linker having a hydroxy equivalent weight between about 200 and about 500, and  
at least about 75 parts of zinc powder  
said second coat comprising the fused and cured product of a coating powder composition comprising  
10 100 parts of a resin comprising A) an epoxy resin plus B) a polyhydroxyl functional cross-linker having a hydroxy equivalent weight between about 200 and about 500, said second coating being zinc-free.
37. The coating powder according to Claim 36 wherein said epoxy resin of said first coat and of said second coat is a bisphenol A epoxy resin.
38. The coating of Claim 36 wherein the coating composition of said first coat contains at least about 150 parts of zinc powder
39. The coating of Claim 36 wherein the coating composition of said first coat contains at least about 200 parts of zinc powder.

40. The coating according to Claim 36 wherein said first coat is between about 1.5 and about 3 mils thick and said second coat is between about 10 and about 15 mils thick.
41. The coating according to Claim 36 wherein said second coat is porous so as to have a density reduced at least about 25 % relative to theoretical density.
42. The coating according to Claim 36 wherein said second coat composition contains between about 20 and about 80 phr fibers.
43. The coating according to Claim 42 wherein said second coat is porous so as to have a density reduced at least about 25 % relative to theoretical density.
44. A coating powder comprising a thermosetting epoxy resin and sufficient p-toluene sulfonyl hydrazide such that when coating powder is applied to a substrate and fused and cured, the resulting coating has a density reduced at least about 25 wt% relative to theoretical density.
45. The coating powder of Claim 44 having sufficient p-toluene sulfonyl hydrazide such that when coating powder is applied to a substrate and fused and cured, the resulting coating has a density reduced at least about 40 wt% relative to theoretical density.
46. The coating powder according to Claim 44 containing between about 20 and about 80 phr fibers.
47. A coating on a substrate formed by fusing and curing the coating powder of Claim 44, said coating having a density reduced at least about 25 wt% relative to theoretical density.

- 48. A coating powder comprising a thermosetting epoxy resin and sufficient alkali metal borohydride such that when coating powder is applied to a substrate and fused and cured in the presence of a proton donor, the resulting coating has a density reduced at least about 25 wt% relative to theoretical density.
- 49. The coating powder of Claim 48 wherein said proton donor is contained within said coating powder.
- 50. The coating powder of Claim 49 wherein said proton donor is alumina trihydrate.

51. The coating powder of Claim 48 having sufficient alkali metal borohydride such that when coating powder is applied to a substrate and fused and cured in the presence of a proton donor, the resulting coating has a density reduced at least about 40 Wt% relative to theoretical density.
52. The coating powder of Claim 48 containing between about 20 and about 80 phr fibers.
53. A coating on a substrate formed by fusing and curing the coating powder of Claim 48, said coating having a density reduced at least about 25 wt% relative to theoretical density.
54. A method of protecting a substrate from chipping and corrosion comprising
  - applying a coating powder comprising 100 parts of a resin system, said resin system comprising a curable epoxy resin, and said coating powder comprising at least about 75 parts zinc powder, and
  - heating said coating powder to fuse and cure said epoxy resin of said coating powder.
55. The method according to Claim 54 further comprising applying a second coating powder over said zinc-containing resin system, said second coating powder comprising a resin system comprising a curable epoxy resin, said second coating powder being zinc free and heating said second coating powder to fuse and cure said epoxy resin of said second coating powder..
56. The method according to Claim 55 wherein said second coating powder is applied over said zinc-containing coating powder before said zinc-containing coating powder is fused and cured, said epoxy resins of said zinc-containing coating powder and of said second coating powder being fused and cured by simultaneously heating said coating powders.

57. The method according to Claim 55 wherein said second coating powder contains a foaming agent, whereby upon curing of said coating powders, a porous outer coating is formed over a zinc-containing layer.--